

SHARC® EZ-Extender®

Manual

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Analog Devices, Inc.
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The SHARC EZ-Extender is warranted against defects in materials and workmanship for a period of one year from the date of purchase from Analog Devices or from an authorized dealer.

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Regulatory Compliance

The SHARC EZ-Extender has been certified to comply with the essential requirements of the European EMC directive 89/336/EEC (inclusive 93/68/EEC) and, therefore, carries the “CE” mark.

The SHARC EZ-Extender has been appended to Analog Devices Development Tools Technical Construction File referenced “DSPTOOLS1” dated December 21, 1997 and was awarded CE Certification by an appointed European Competent Body and is on file.



The EZ-KIT Lite evaluation system contains ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused EZ-KIT Lite boards in the protective shipping package.



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PREFACE

Thank you for purchasing the SHARC® EZ-Extender®, Analog Devices (ADI) extension board to the EZ-KIT Lite® evaluation system for ADSP-21262 SHARC processors.

The SHARC processors are based on a 32-bit super Harvard architecture that includes a unique memory architecture comprised of two large on-chip, dual-ported SRAM blocks coupled with a sophisticated IO processor, which gives SHARC the bandwidth for sustained high-speed computations. SHARC represents today's de facto standard for floating-point processors targeted for premium audio applications.

The SHARC EZ-Extender is designed to be used in conjunction with the ADSP-21262 EZ-KIT Lite evaluation system. The EZ-KIT Lite includes an evaluation suite of VisualDSP++® software, which is limited in program memory size for use solely with the EZ-KIT Lite product.

VisualDSP++ is a powerful programming tool with flexibility that significantly decreases the time required to port software code to a processor, reducing time-to-market.

To learn more about Analog Devices development software, go to <http://www.analog.com/dsp/tools/>.

Example programs are available to demonstrate the capabilities of the SHARC EZ-Extender board.

The SHARC EZ-Extender is a separately sold assembly that plugs onto the expansion interface of the ADSP-21262 EZ-KIT Lite evaluation system.

Purpose of This Manual

The board extends the capabilities of the evaluation system by providing a connection between the parallel data access port (PDAP) of the ADSP-21262 processor and an Analog Devices analog-to-digital high-speed converter (ADC HSC) evaluation board. Moreover, the extender broadens the range of the EZ-KIT Lite applications by providing surface-mounted (SMT) footprints for breadboard capabilities and access to all of the pins on the EZ-KIT Lite's expansion interface.

The extender features:

- High-speed converter evaluation board interface
 - ✓ 40-pin, right angle, 0.1 in. spacing, female socket to connect to analog-to-digital converter boards
 - ✓ Switches for routing and direction selection
 - ✓ RJ-45 with serial peripheral interconnect (SPI) to configure converter registers
- SMT footprint area
 - ✓ 1206 and 805 footprints
 - ✓ SOIC24 and SOIC20 footprints
- Dimensions
 - ✓ 5 in (H) x 5 in (W)

Purpose of This Manual

The *SHARC EZ-Extender Manual* describes the operation and configuration of the components on the board. A schematic and a bill of materials are provided as a reference for future ADSP-21262 processor board designs.

Intended Audience

This manual is a user's guide and reference to the SHARC EZ-Extender. Programmers who are familiar with the Analog Devices SHARC processor architecture, operation, and development tools are the primary audience for this manual.

Programmers who are unfamiliar with VisualDSP++ or EZ-KIT Lite evaluation software should refer to the *ADSP-21262 EZ-KIT Lite Evaluation System Manual*, VisualDSP++ online Help, and user's or getting started guides. For the locations of these documents, refer to “[Related Documents](#)”.

Manual Contents

The manual consists of:

- Chapter 1, “[EZ-Extender Interfaces](#)” on page 1-1
Provides basic board information.
- Chapter 2, “[EZ-Extender Hardware Reference](#)” on page 2-1
Provides information on the hardware aspects of the board.
- Appendix A, “[EZ-Extender Bill Of Materials](#)” on page A-1
Provides a list of components used to manufacture the SHARC EZ-Extender board.

What's New in This Manual

- Appendix B, “EZ-Extender Schematic” on page B-1
Provides the resources to allow modifications to the EZ-Extender or to use as a reference design.



Appendix B now is part of the online Help. The PDF version of the *SHARC EZ-Extender Manual* is located in the Docs\EZ-KIT Lite Manuals folder on the installation CD. Alternatively, the book can be found at the Analog Devices Web site, www.analog.com/processors.

What's New in This Manual

This edition of the *SHARC EZ-Extender Manual* has been updated for the latest revision of VisualDSP++.

Technical or Customer Support

You can reach Analog Devices, Inc. Customer Support in the following ways:

- Visit the Embedded Processing and DSP products Web site at <http://www.analog.com/processors/technicalSupport>
- E-mail tools questions to processor.tools.support@analog.com
- E-mail processor questions to
processor.support@analog.com (World wide support)
processor.europe@analog.com (Europe support)
processor.china@analog.com (China support)
- Phone questions to 1-800-ANALOGD

- Contact your Analog Devices, Inc. local sales office or authorized distributor
- Send questions by mail to:
Analog Devices, Inc.
One Technology Way
P.O. Box 9106
Norwood, MA 02062-9106
USA

Supported Products

The SHARC EZ-Extender is designed as an extension to the ADSP-21262 EZ-KIT Lite evaluation system.

Product Information

You can obtain product information from the Analog Devices Web site, from the product CD-ROM, or from the printed publications (manuals).

Analog Devices is online at www.analog.com. Our Web site provides information about a broad range of products—analog integrated circuits, amplifiers, converters, and digital signal processors.

MyAnalog.com

MyAnalog.com is a free feature of the Analog Devices Web site that allows customization of a Web page to display only the latest information on products you are interested in. You can also choose to receive weekly e-mail notifications containing updates to the Web pages that meet your interests. MyAnalog.com provides access to books, application notes, data sheets, code examples, and more.

Product Information

Registration:

Visit www.myanalog.com to sign up. Click **Register** to use MyAnalog.com. Registration takes about five minutes and serves as means for you to select the information you want to receive.

If you are already a registered user, just log on. Your user name is your e-mail address.

Processor Product Information

For information on embedded processors and DSPs, visit our Web site at www.analog.com/processors, which provides access to technical publications, data sheets, application notes, product overviews, and product announcements.

You may also obtain additional information about Analog Devices and its products in any of the following ways.

- E-mail questions or requests for information to
processor.support@analog.com (World wide support)
processor.europe@analog.com (Europe support)
processor.china@analog.com (China support)
- Fax questions or requests for information to
1-781-461-3010 (North America)
+49-89-76903-157 (Europe)

Related Documents

For information on product-related development software, see the following publications.

Table 1. Related Processor Publications

Title	Description
<i>ADSP-21262 SHARC Microprocessor Datasheet</i>	General functional description, pinout, and timing
<i>ADSP-2126x SHARC DSP Core Manual</i> <i>ADSP-2126x SHARC DSP Peripherals Manual</i>	Description of internal processor architecture, registers, and all peripheral functions
<i>ADSP-21160 SHARC DSP Instruction Set Reference</i>	Description of all allowed processor assembly instructions

Table 2. Related VisualDSP++ Publications

Title	Description
<i>VisualDSP++ Assembler and Preprocessor Manual for SHARC Processors</i>	Description of the assembler function and commands for SHARC processors
<i>VisualDSP++ C/C++ Complier and Library Manual for SHARC Processors</i>	Description of the complier function and commands for SHARC processors
<i>VisualDSP++ Linker and Utilities Manual</i>	Description of the linker function and commands for the processors
<i>VisualDSP++ Loader and Utilities Manual</i>	Description of the loader function and commands for the processors
<i>VisualDSP++ User's Guide</i>	Detailed description of VisualDSP++ features and usage



If you plan to use the EZ-KIT Lite board in conjunction with a JTAG emulator, also refer to the documentation that accompanies the emulator.

All documentation is available online. Most documentation is available in printed form.

Visit the Technical Library Web site to access all processor and tools manuals and data sheets:

<http://www.analog.com/processors/resources/technicalLibrary>.

Online Technical Documentation

Online documentation comprises the VisualDSP++ Help system, software tools manuals, hardware tools manuals, processor manuals, the Dinkum Abridged C++ library, and Flexible License Manager (FlexLM) network license manager software documentation. You can easily search across the entire VisualDSP++ documentation set for any topic of interest. For easy printing, supplementary .PDF files of most manuals are provided in the `Docs` folder on the VisualDSP++ installation CD.

Each documentation file type is described as follows.

File	Description
.CHM	Help system files and manuals in Help format
.HTM or .HTML	Dinkum Abridged C++ library and FlexLM network license manager software documentation. Viewing and printing the .HTML files requires a browser, such as Internet Explorer 5.01 (or higher).
.PDF	VisualDSP++ and processor manuals in Portable Documentation Format (PDF). Viewing and printing the .PDF files requires a PDF reader, such as Adobe Acrobat Reader (4.0 or higher).

If documentation is not installed on your system as part of the software installation, you can add it from the VisualDSP++ CD at any time by running the Tools installation. Access the online documentation from the VisualDSP++ environment, Windows® Explorer, or the Analog Devices Web site.

Notation Conventions

Text conventions used in this manual are identified and described as follows.

Example	Description
{this that}	Alternative required items in syntax descriptions appear within curly brackets and separated by vertical bars; read the example as <code>this</code> or <code>that</code> . One or the other is required.
[this that]	Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as an optional <code>this</code> or <code>that</code> .
[this,...]	Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipse; read the example as an optional comma-separated list of <code>this</code> .
.SECTION	Commands, directives, keywords, and feature names are in text with letter gothic font.
<i>filename</i>	Non-keyword placeholders appear in text with italic style format.
	Note: For correct operation, ... A Note provides supplementary information on a related topic. In the online version of this book, the word Note appears instead of this symbol.
	Caution: Incorrect device operation may result if ... Caution: Device damage may result if ... A Caution identifies conditions or inappropriate usage of the product that could lead to undesirable results or product damage. In the online version of this book, the word Caution appears instead of this symbol.
	Warning: Injury to device users may result if ... A Warning identifies conditions or inappropriate usage of the product that could lead to conditions that are potentially hazardous for the devices users. In the online version of this book, the word Warning appears instead of this symbol.



Additional conventions, which apply only to specific chapters, may appear throughout this document.

Notation Conventions

1 EZ-EXTENDER INTERFACES

This chapter relates how the extender interfaces with the compatible boards. The information is presented in the following sections.

- “[ADC HSC Interface](#)” on page 1-1
- “[Breadboard Area](#)” on page 1-2

ADC HSC Interface

The SHARC EZ-Extender can connect to an analog-to-digital high-speed converter (ADC HSC) evaluation board via the ADC HSC interface. The ADC HSC interface consists of a 40-pin female header, which contains all of the control and data signals necessary to transfer data between the parallel data access port (PDAP) of the processor and the HSC evaluation board. Additionally, the extender provides a RJ-45 connector, which contains all of the serial peripheral interconnect (SPI) signals necessary to configure the control registers of capable high-speed converters. For a block diagram of the ADC HSC interface, see [Figure 2-1 on page 2-2](#).

Before using the SHARC EZ-Extender, familiarize yourself with the documentation and schematics of the target board and the ADSP-21262 EZ-KIT Lite. For example, on the EZ-KIT Lite, it may be necessary to disable other devices on the PDAP or disable the push buttons.

To configure the SHARC EZ-Extender to connect to an ADC HSC evaluation board, determine the source of the PDAP clock and the direction of the general-purpose signals, `DAI_P15_GP1` and `DAI_P16_GP2`. To learn about possible clock settings, refer to “[Direction/Clock Source Control](#)

Breadboard Area

Switch (SW1)" on page 2-3. The setup of the general-purpose signals DAI_P15_GP1 and DAI_P16_GP2 is dependent on the specific ADC HSC evaluation board being interfaced; therefore, the board's model must be taken into consideration.

The data bus of the EZ-Extender must be enabled before data is read. Enable the data bus by a memory read from address 0x160 0000, which the AD[15:0] pins set up as the external port. Then, the AD[15:0] pins can be set up in PDAP mode.

A list of ADC boards compatible with the extender can be found at http://www.analog.com/processors/processors/blackfin/technicalLibrary/manuals/pdf/EZ-Extender_to_DSP_Supported.pdf. Contact Technical Support for information about available examples. To learn more about Analog Devices data converters, go to www.analog.com.

Breadboard Area

SHARC EZ-Extender broadens the range of the EZ-KIT Lite applications by providing surface mounted (SMT) footprints for breadboard capabilities and access to all of the pins on the EZ-KIT Lite's expansion interface.

2 EZ-EXTENDER HARDWARE REFERENCE

This chapter describes the hardware design of the SHARC EZ-Extender. The following topics are covered.

- “[System Architecture](#)” on page 2-1
Describes the configuration of the extender and explains how the board components interface with the processor and EZ-KIT Lite.
- “[DIP Switches and Jumpers](#)” on page 2-3
Describes the function of the configuration DIP switches and jumpers.

System Architecture

A detailed block diagram of the SHARC EZ-Extender is shown in [Figure 2-1](#). Note that the arrow in the bidirectional driver symbols denotes the direction of the driver when in transmit mode. The bidirectional driver is in transmit mode when the direction pin is pulled high. Use the diagram in conjunction with information in “[DIP Switches and Jumpers](#)” on page 2-3 section of this manual to configure your SHARC EZ-Extender.

Before using the SHARC EZ-Extender, familiarize yourself with the documentation and schematics of the target board and the ADSP-21262 EZ-KIT Lite. For example, on the EZ-KIT Lite, it may be necessary to disable other devices on the parallel data access port (PDAP) or disable the push buttons.

System Architecture

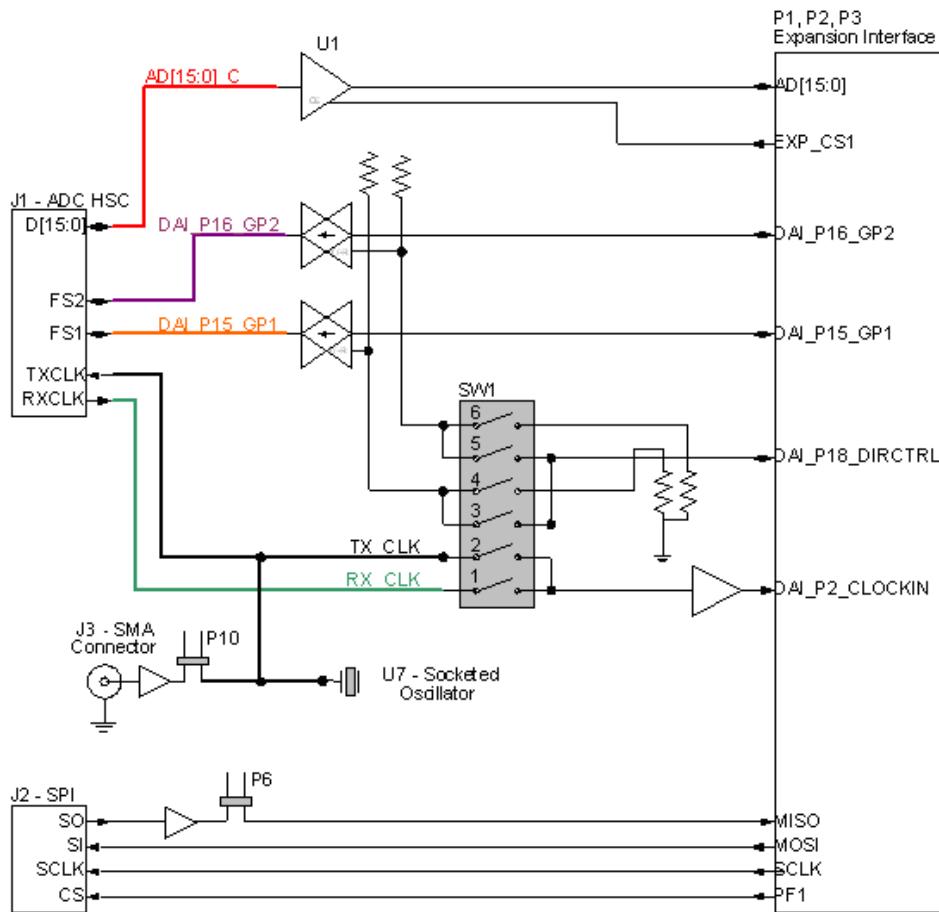


Figure 2-1. SHARC EZ-Extender Block Diagram

The block diagram in [Figure 2-1](#) shows that each clock and general-purpose signal attached to the analog-to-digital high-speed converter (ADC HSC) interface is configured depending on how the interface operates.

The EZ-Extender has two clock signals, **TX_CLK** and **RX_CLK**. The **TX_CLK** signal is used as an output and can be generated in three ways: by applying a signal via an SMA connector, by using the **RX_CLK** signal, or by populat-

ing a socket with an oscillator. Only one of these sources can be used at a time, the other sources must be disabled. For more information on how to disable the TX_CLK sources, see “[SMA Connector Clock Disconnect Jumper \(P10\)](#)” on page 2-5. The RX_CLK signal is generated by the target board. Both the TX_CLK and RX_CLK can connect to the processor’s clock-in signal (DAI_P2_CLOCKIN) as an input. See “[Direction/Clock Source Control Switch \(SW1\)](#)” on page 2-3 for more information.

The ADC interface has two general-purpose signals, DAI_P15_GP1 and DAI_P16_GP2. The evaluation board with which the extender interfaces determines how these signals are set up. For information on how to set the direction and the source of these signals, refer to “[Direction/Clock Source Control Switch \(SW1\)](#)” on page 2-3.

The ADC interface connects to the PDAP of the ADSP-21262 processor. The PDAP is multiplexed with the address and data bus. To avoid bus contention with the memory devices on the EZ-KIT Lite, the driver connected to the data bus of the ADC must be enabled. For more information about enabling the data bus, see “[ADC HSC Interface](#)” on page 1-1.

DIP Switches and Jumpers

The following section describes the function of all of the jumpers and switches on the EZ-Extender. Before connecting the extender, familiarize yourself with each possible setting’s effect on your application.

Direction/Clock Source Control Switch (SW1)

A designated DIP switch, SW1, provides an independent direction control for the general-purpose signals (DAI_P15_GP1 and DAI_P16_GP2), as illustrated in [Figure 2-1 on page 2-2](#). Each signal can be hardwired to be either transmit or receive, or can be changed in real time using the DAI_P18 processor pin. If the DAI_P18 processor pin is intended for the direction control, ensure the pin is not used for other purposes on the EZ-KIT Lite.

DIP Switches and Jumpers

When the SW1 switch connects a direction control signal to ground (GND), the corresponding signal (signals) is (are) controlled as input. The direction control functionality is summarized in [Table 2-1](#).

Table 2-1. DAI_P15_GP1/DAI_P16_GP2 Direction Control Settings

SW1 Position 3 SW1 Position 5	SW1 Position 4 SW1 Position 6	DAI_P15_GP1 Direction DAI_P16_GP2 Direction
OFF	OFF	EZ-KIT Lite is transmitter
OFF	ON	DAI_P18 sets the direction: 0 = EZ-KIT Lite is receiver 1 = EZ-KIT Lite is transmitter
ON	OFF	EZ-KIT Lite is receiver
ON	ON	Do not use

The source of the PDAP clock input signal, DAI_PP2_CLOCKIN, is configured through positions 1 and 2 of the DIP switch SW1, as illustrated in [Figure 2-1 on page 2-2](#). The switch settings are summarized in [Table 2-2](#).

Table 2-2. PDAP Clock-in Source Settings

SW1 Position 1 RX_CLK	SW1 Position 2 TX_CLK	DAI_P2_CLOCKIN Source
OFF	OFF	Not generated by the EZ-Extender
OFF	ON	In this configuration, the TX_CLK signal must be generated by one of the user configured clock sources.
ON	OFF	RX_CLK
ON	ON	RX_CLK; in this configuration, the RX_CLK signal is also routed to the TX_CLK to be used as an output.

MISO Disconnect Jumper (P6)

The MISO signal of the serial peripheral interconnect (SPI) connector (J2) is driven by a buffer to the processor's MISO signal, as illustrated in [Figure 2-1 on page 2-2](#). When the SPI connector is not in use, remove the P6 jumper to prevent the signal from interfering with other devices on the SPI bus.

SMA Connector Clock Disconnect Jumper (P10)

The SMA connector (J3) enables a clock input from a signal generator or from other clock source. The input signal is directed through a buffer, as illustrated in [Figure 2-1 on page 2-2](#). When the SMA connector is not in use, remove the P10 jumper to prevent the buffer from driving other signals on the net.

DIP Switches and Jumpers

A EZ-EXTENDER BILL OF MATERIALS

The bill of materials corresponds to “[EZ-Extender Schematic](#)” on [page B-1](#). Please check the latest schematic on the Analog Devices Web site:

<http://www.analog.com/Processors/Processors/DevelopmentTools/technicalLibrary/manuals/DevToolsIndex.html#Evaluation%20Kit%20Manuals>.

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
1	1	74LVX244M SOIC20	U6	FAIRCHILD	74LVX244M
2	1	SN74ALVTH162 44 SSOP48	U1	TI	74ALVTH16244DGGE4
3	1	SN74LVC1G125 SOT23-5	U5	TI	74LVC1G125DBVRE4
4	1	74LVTH16245M EA SSOP48	U2	FAIRCHILD	74LVTH16245MEA
5	1	SN74LVC1G14D BVR SOT23-5	U3	DIGI-KEY	296-11607-1-ND
6	1	DIP8DIP8SOC	U7	MILL-MAX	614-43-308-31-007000
7	3	0.05 45x2 CON018	P1-3	SAMTEC	TFC-145-32-F-D
8	1	DIP6SWT017	SW1	C&K	TDA06H0SB1
9	1	IDC 20X2 IDC20X2RASOC	J1	SAMTEC	SSW-120-02-G-D-RA

Ref.	Qty.	Description	Reference Designator	Manufacturer	Part Number
10	1	RJ45 8PIN CON_RJ45	J2	TYCO	1-16609214-1
11	1	SMA XPIINS CON043	J3	JOHNSON COMP	142-0701-201
12	2	IDC 2X1 IDC2X1	P6,P10	FCI	90726-402HLF
13	2	IDC 2PIN_JUMPER_SHORT	SJ1-2	DIGI-KEY	S9001-ND
14	1	511/8W5%1206	R9	VISHAY	CRCW120651R0JKEA
15	14	0.1UF 50V 10% 0805	C3-10,C12, C14-18	AVX	08055C104KAT
16	16	10K 1/10W 5% 0805	R1-2,R5-7, R11-12,R16	VISHAY	CRCW080510K0JNEA
17	3	33 1/10W 5% 0805	R10,R13,R18	VISHAY	CRCW080533R0JNEA
18	4	10UF 25V +80-20% 1210	C1-2,C11,C13	PANASONIC	ECJ4YF1E106Z
19	2	22 1/10W 5% 0805	R3-4	VISHAY	CRCW080522R0JNEA
20	2	1.2K 1/10W 5% 0805	R15,R17	VISHAY	CRCW08051K20JNEA
21	1	10K 1/2W 10% RES002	R8	COPAL ELECT	CT9EW103

1

1

2

2

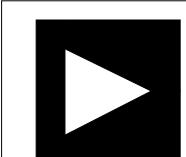
3

3

4

4

ADSP-21262 EZ-Extender 1



ANALOG 20 Cotton Road
DEVICES Nashua, NH 03063
PH: 1-800-ANALOGD

Title ADSP21262 EX-EXTENDER 1
TITLE

Size C	Board No. A0182-2003	Rev 2.0
Date 4-24-2006_9:28	Sheet 1 of 7	D

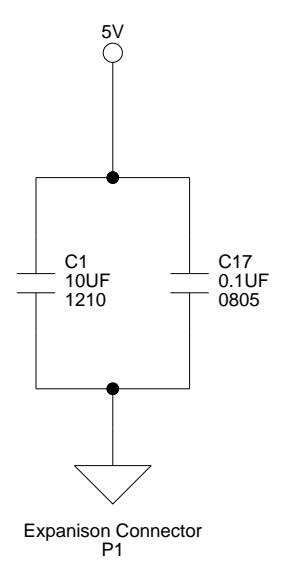
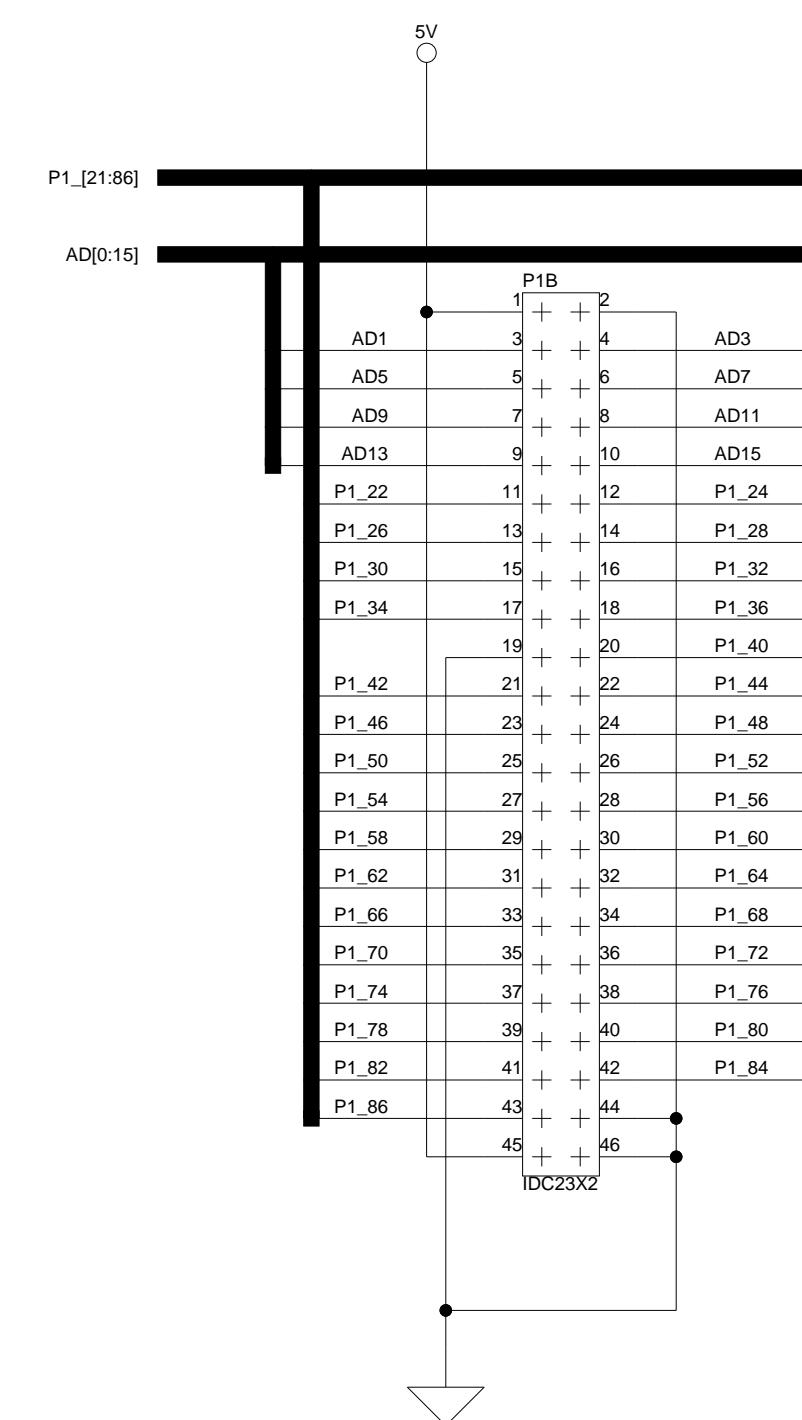
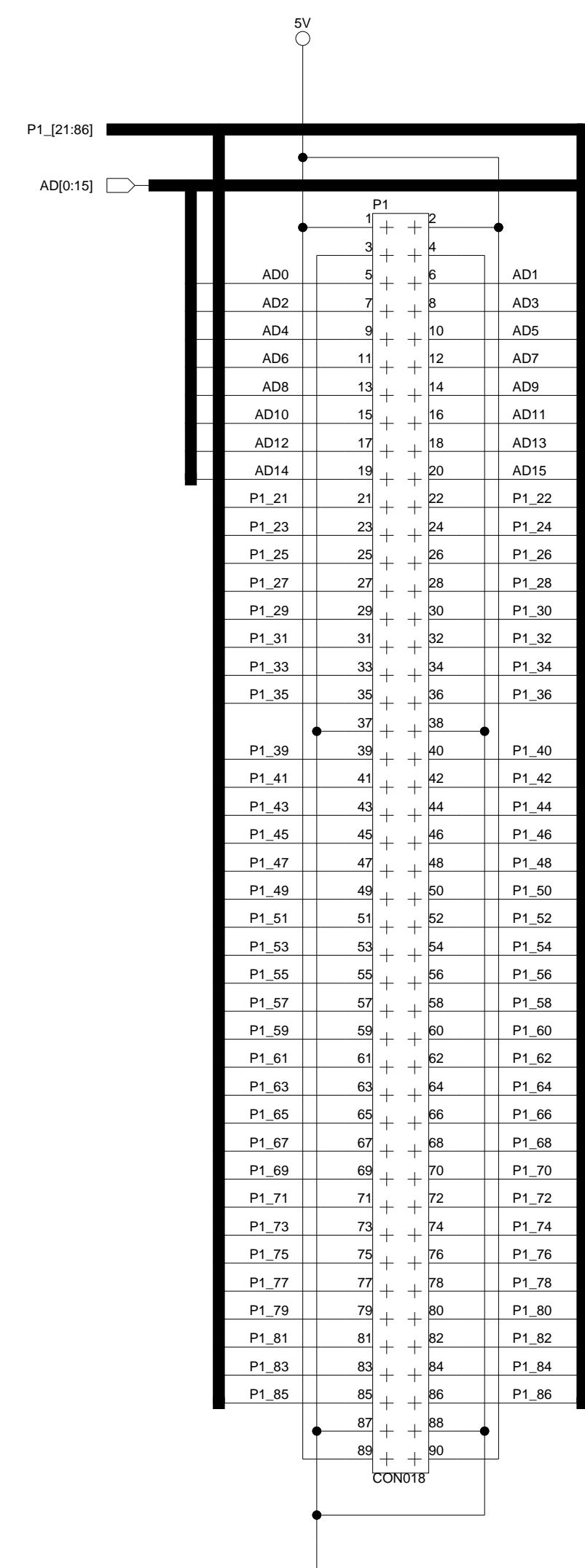
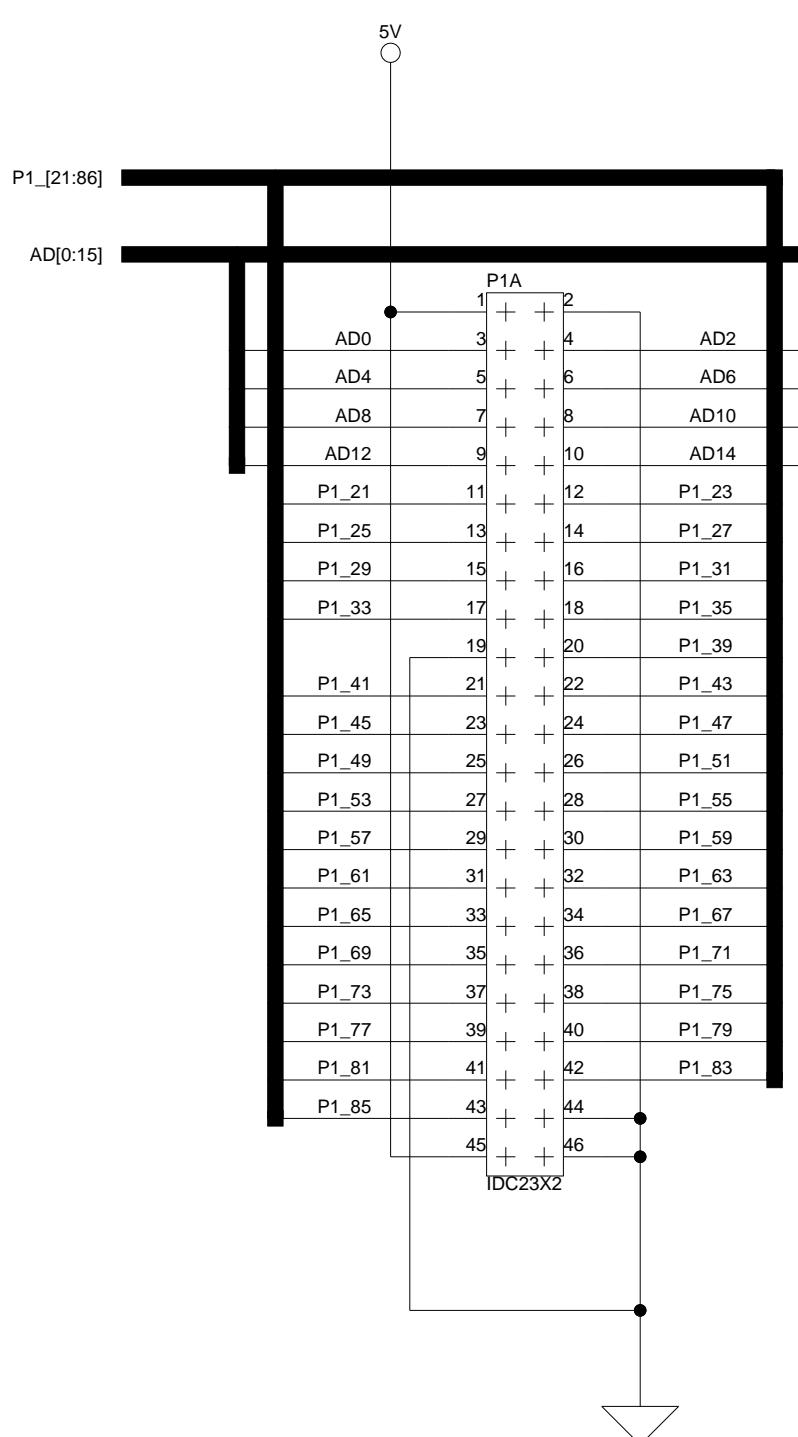
A

B

C

D

EXPANSION INTERFACE (TYPE A)



ANALOG DEVICES 20 Cotton Road
Nashua, NH 03063
PH: 1-800-ANALOGD

Title ADSP21262 EX-EXTENDER 1
EXPANSION CONNECTOR P1

Size C	Board No.	A0182-2003	Rev 2.0
Date 4-24-2006 9:28	Sheet 2 of 7		

A

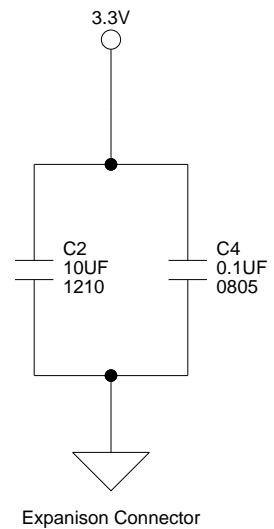
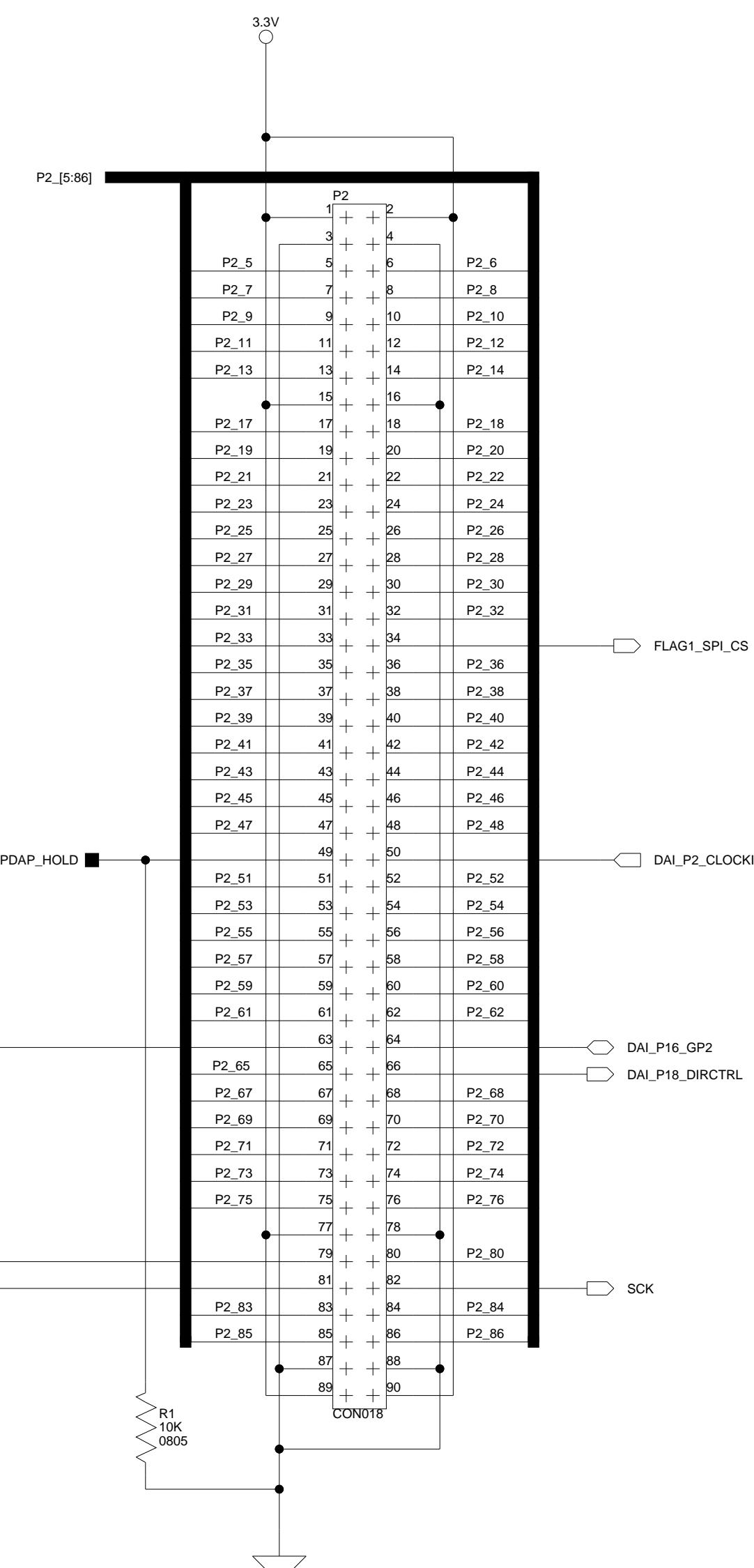
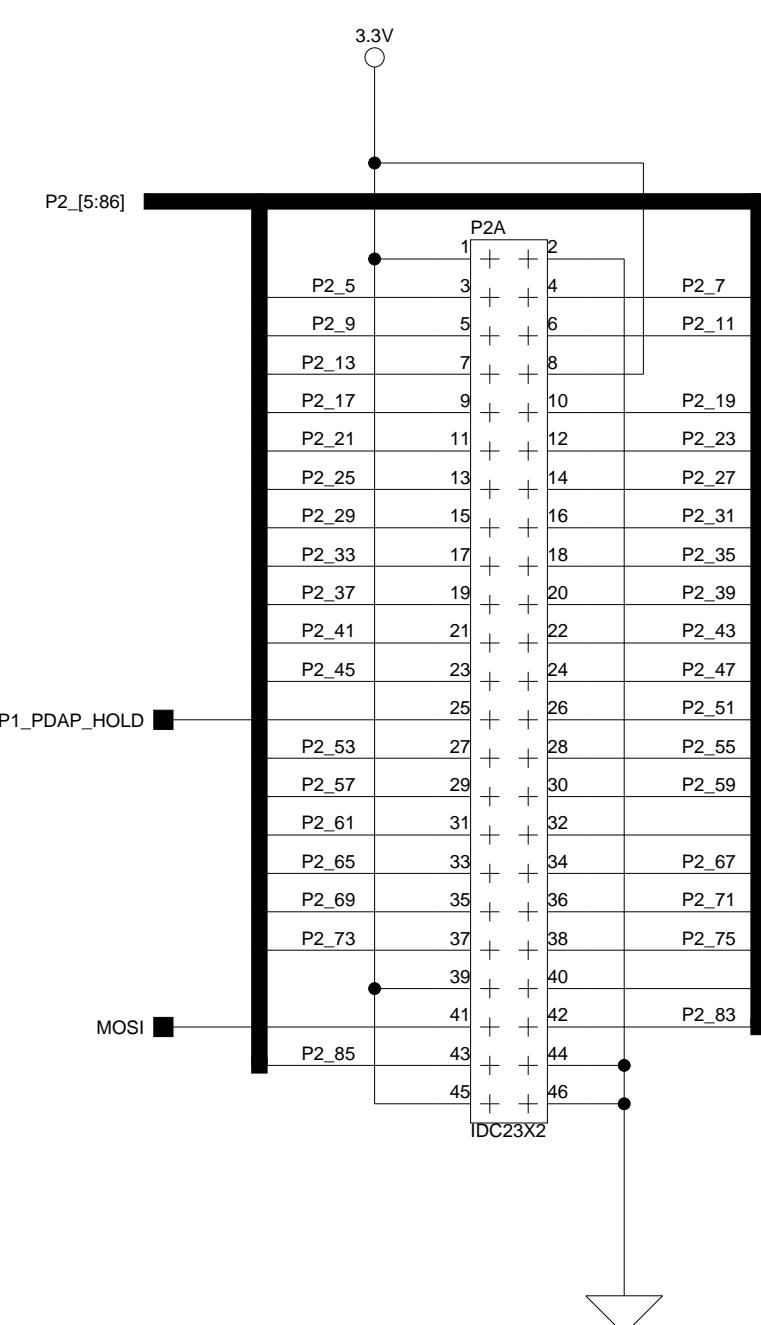
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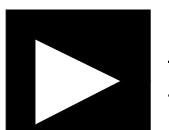
C

D

A B C D

EXPANSION INTERFACE (TYPE A)



 ANALOG
DEVICES 20 Cotton Road
Nashua, NH 03063
PH: 1-800-ANALOGD

Title ADSP21262 EX-EXTENDER 1
EXPANSION CONNECTOR P2

Size C	Board No.	A0182-2003	Rev 2.0
Date 4-24-2006_9:28	Sheet 3 of 7		D

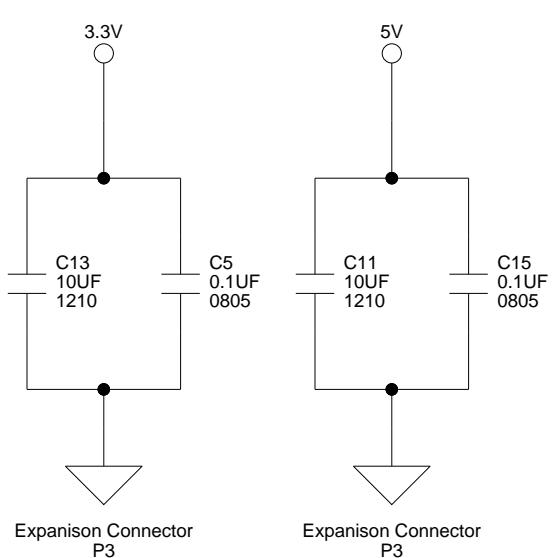
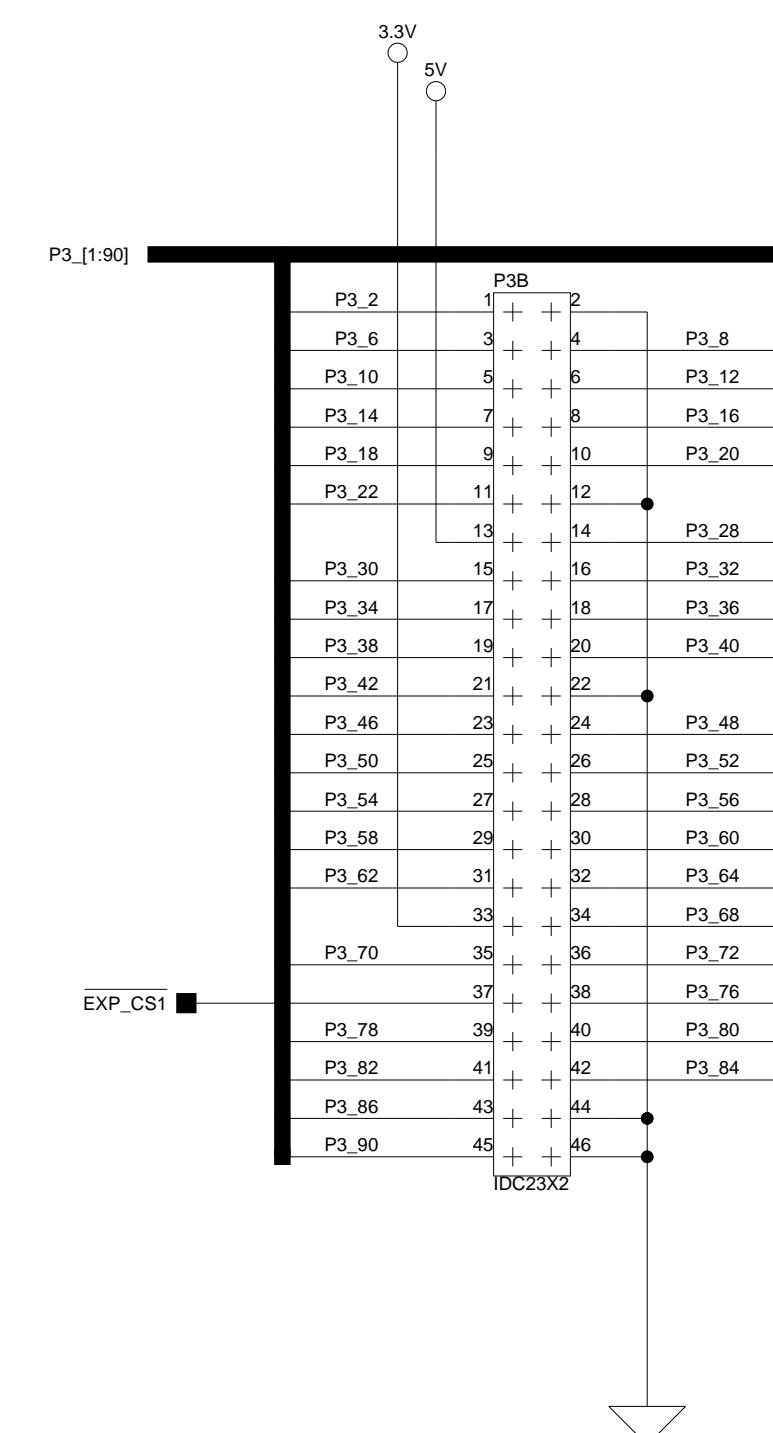
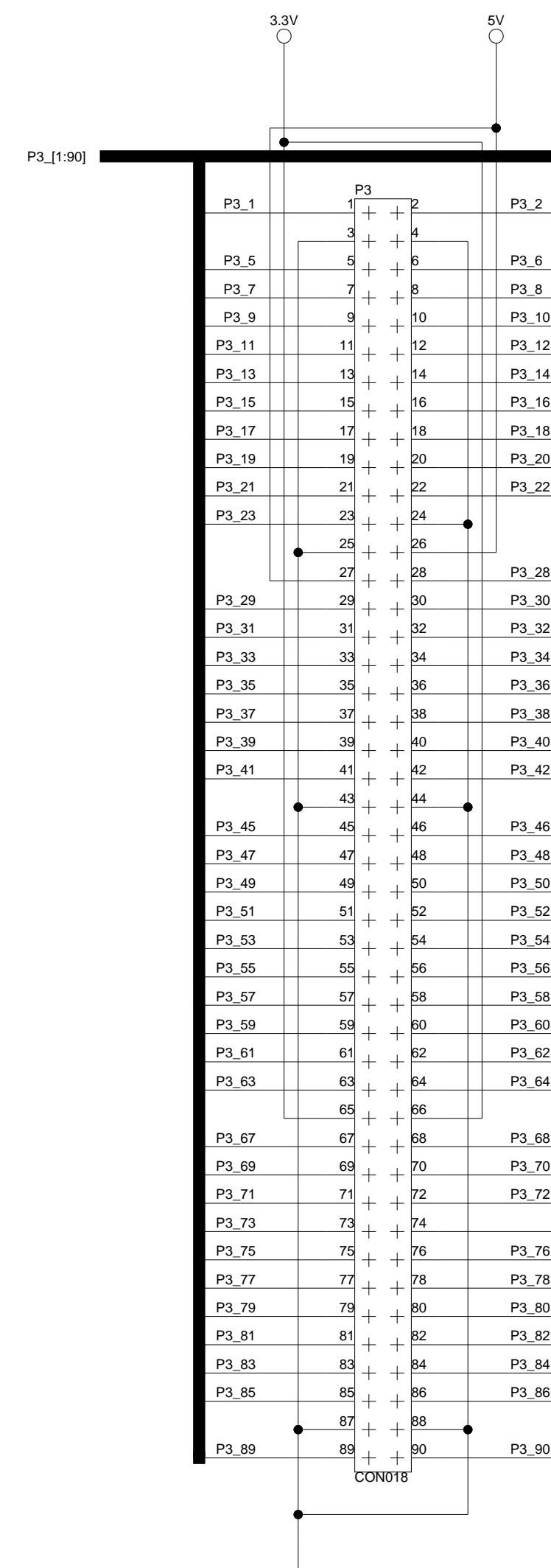
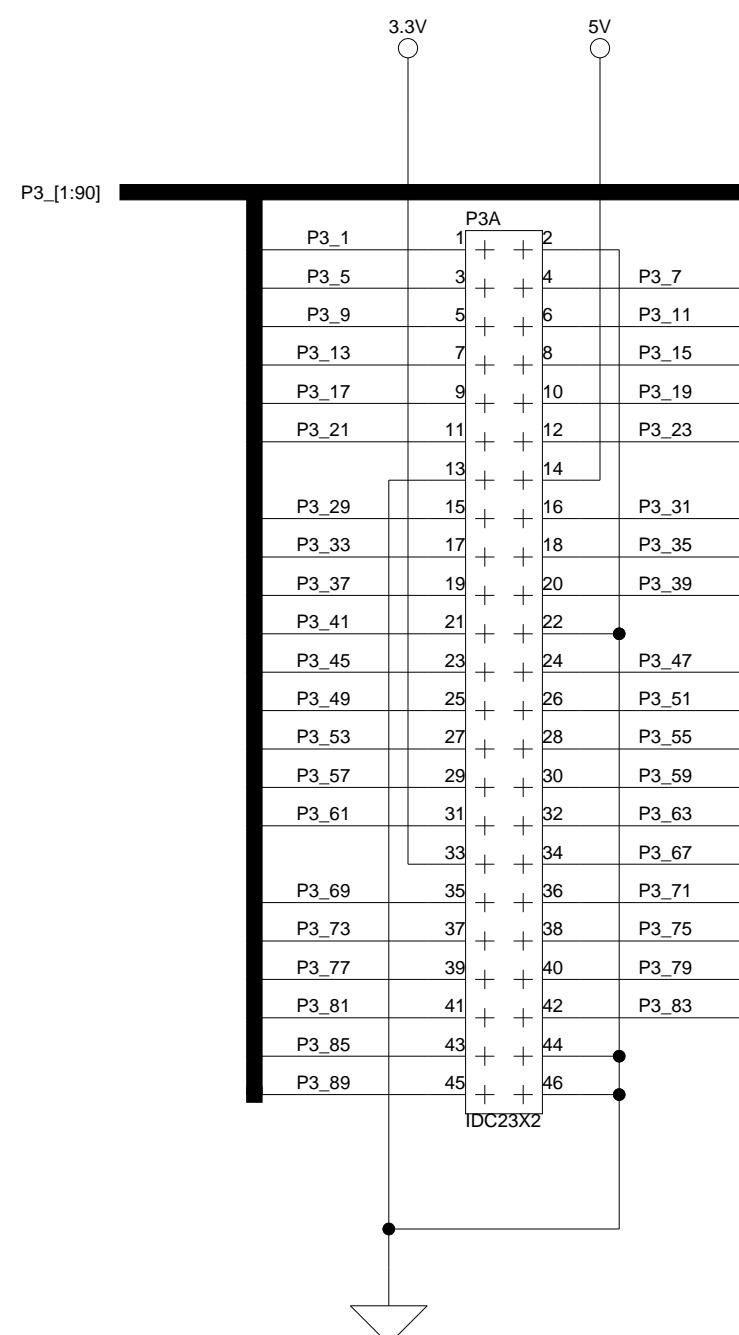
A

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C

D

EXPANSION INTERFACE (TYPE A)



ANALOG DEVICES 20 Cotton Road
Nashua, NH 03063
PH: 1-800-ANALOGD

Title ADSP21262 EX-EXTENDER 1
EXPANSION CONNECTOR P3

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Date	4-24-2006 9:28		Sheet 4 of 7

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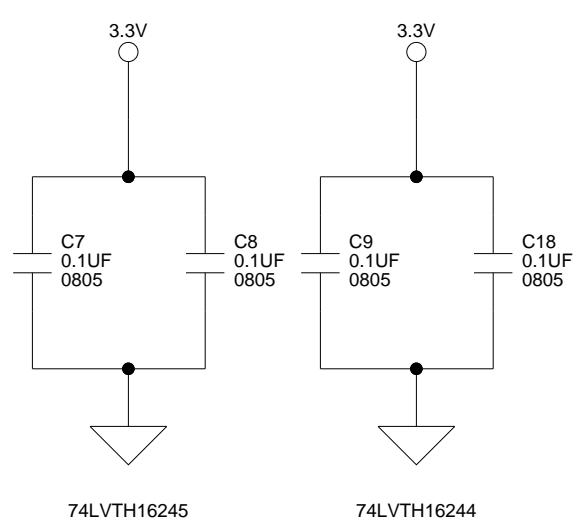
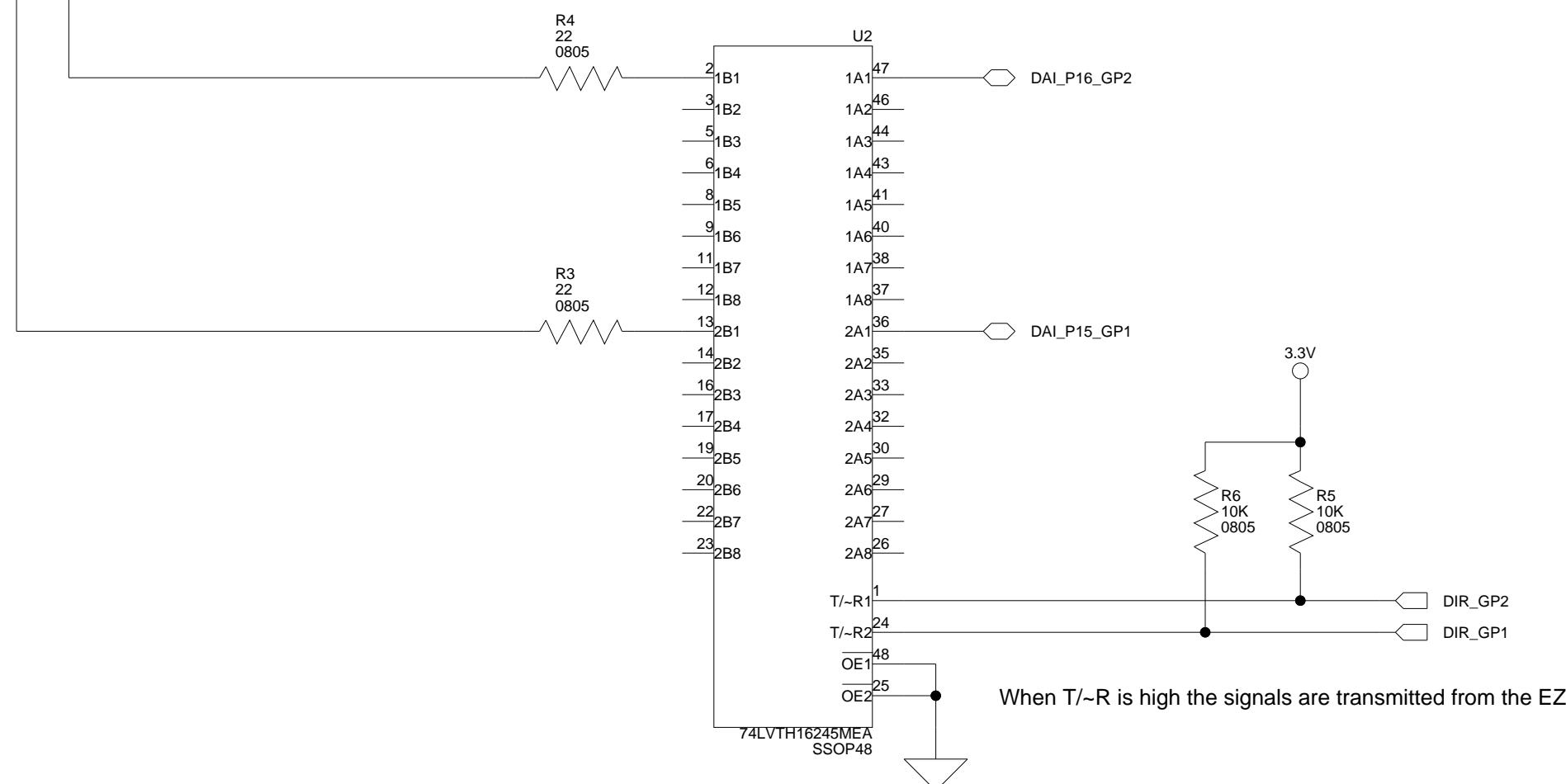
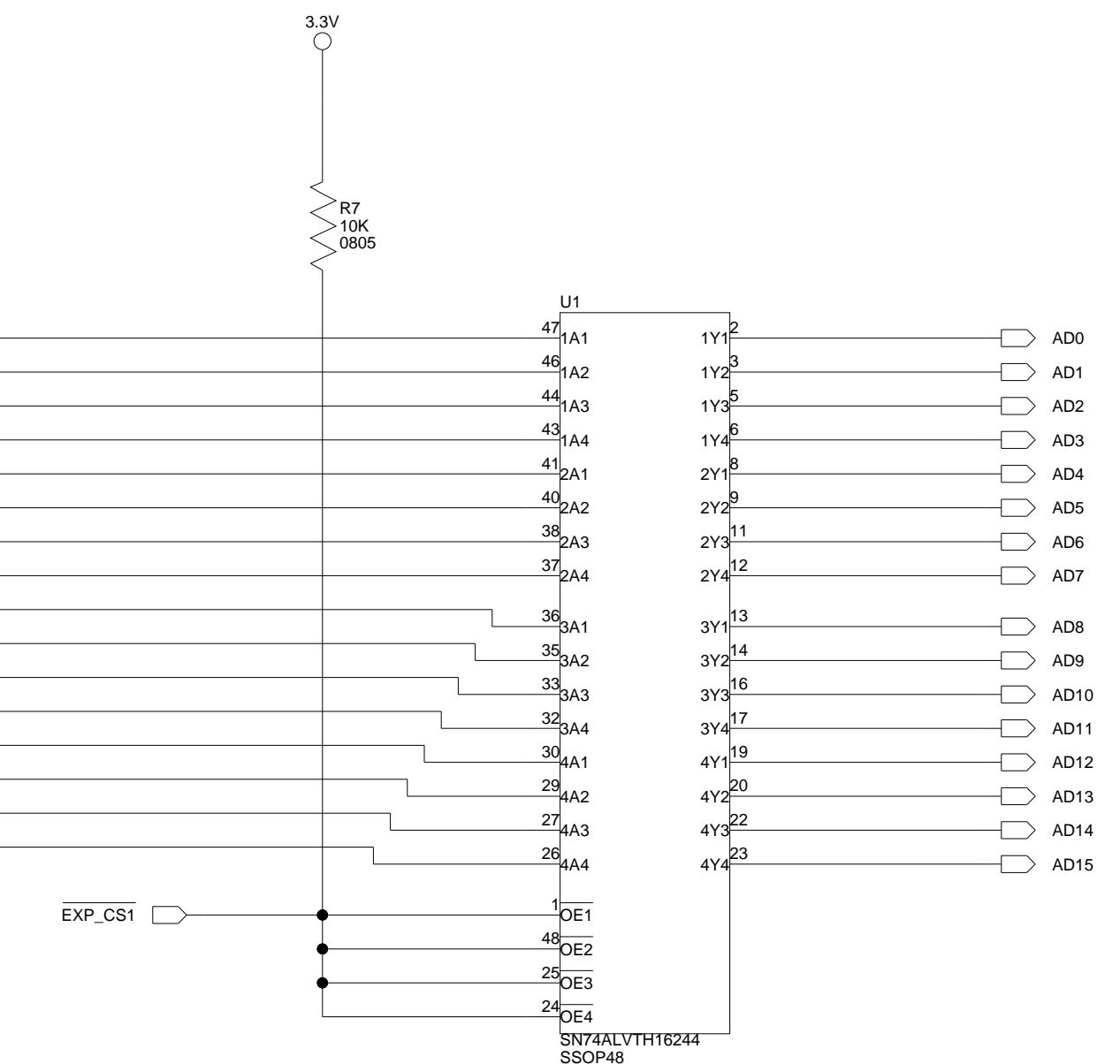
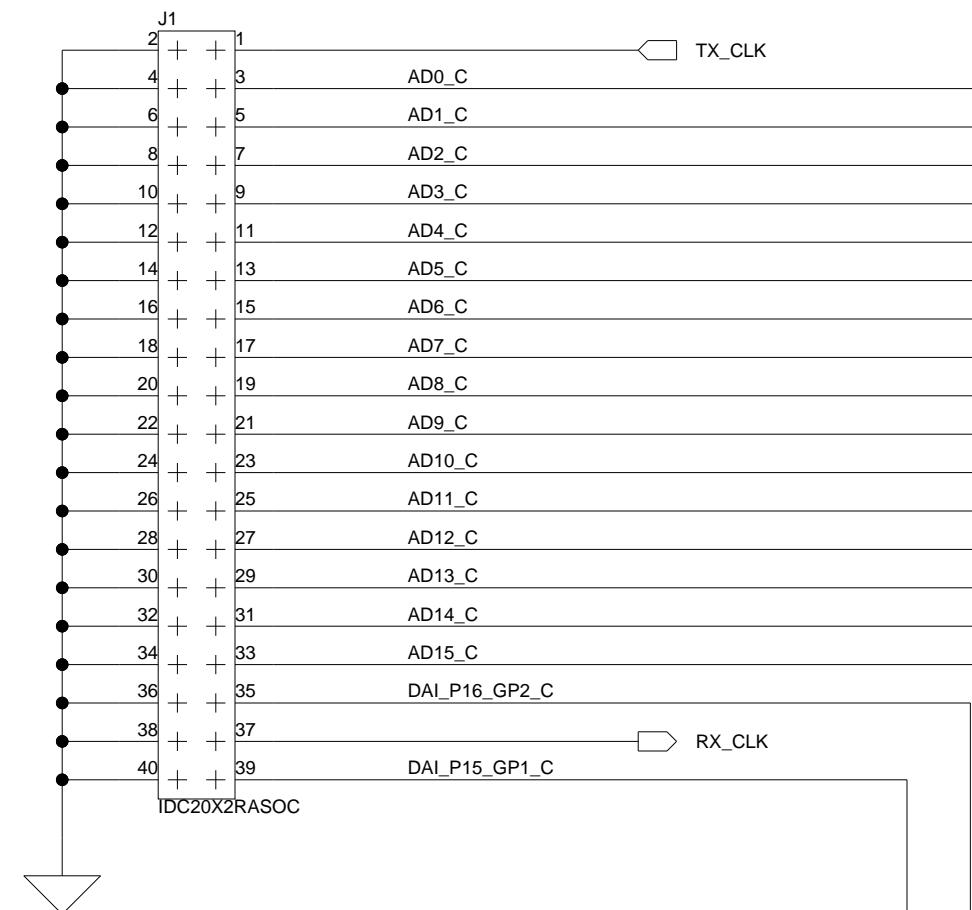
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**Interface to ADC
Eval Board**



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Title ADSP21262 EX-EXTENDER 1
HSC INTERFACE

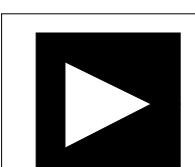
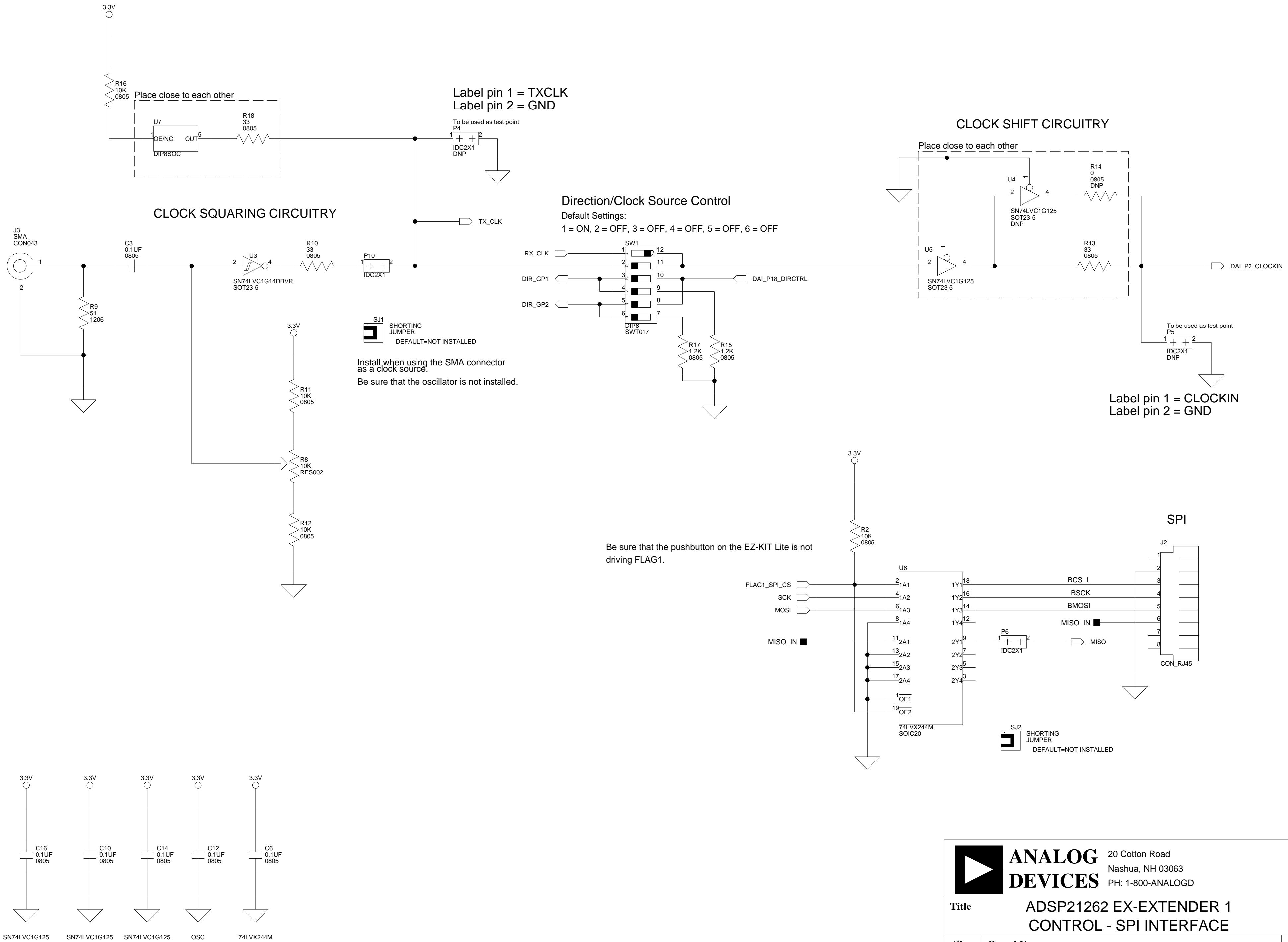
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20 Cotton Road
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Title ADSP21262 EX-EXTENDER 1
CONTROL - SPI INTERFACE

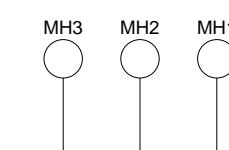
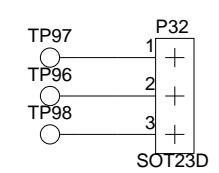
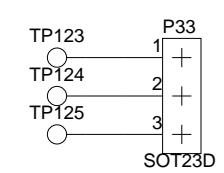
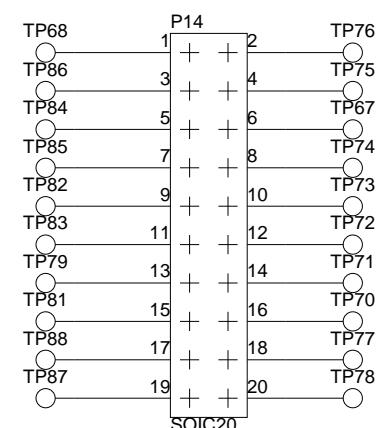
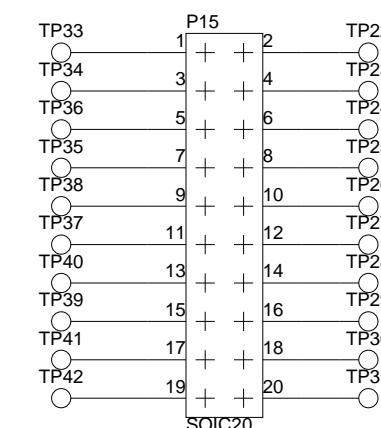
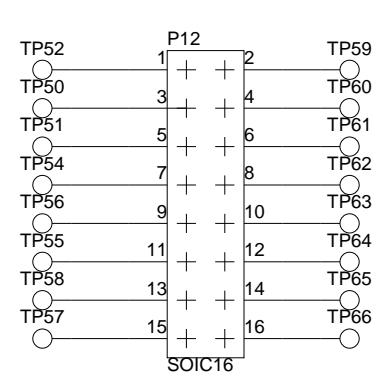
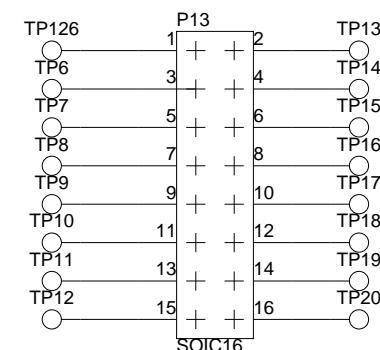
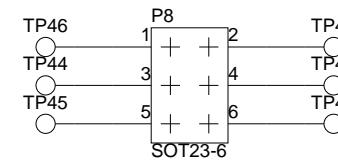
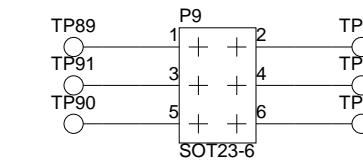
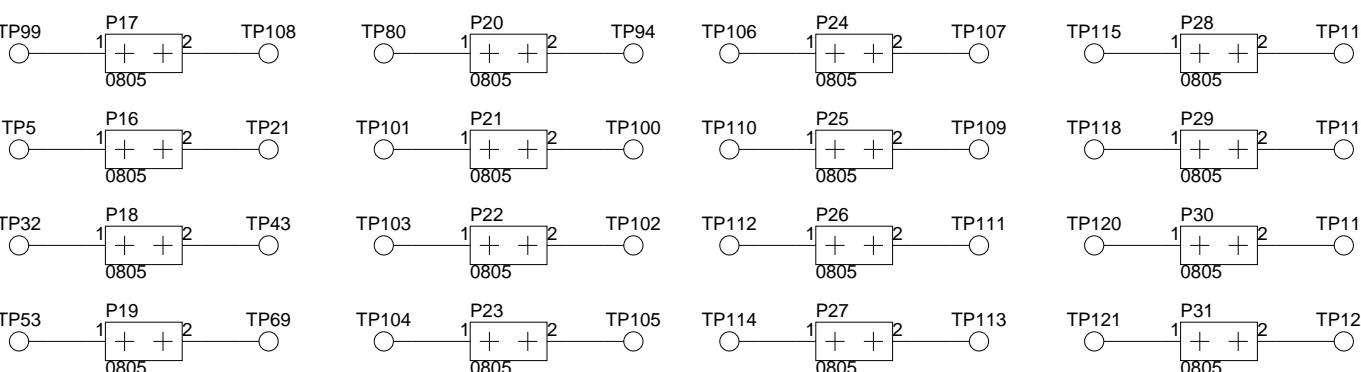
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ANALOG DEVICES 20 Cotton Road
Nashua, NH 03063
PH: 1-800-ANALOGD

Title ADSP21262 EX-EXTENDER 1
BREADBOARD AREA FOOTPRINTS

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